

Gas Exchange & Transport in Vertebrates

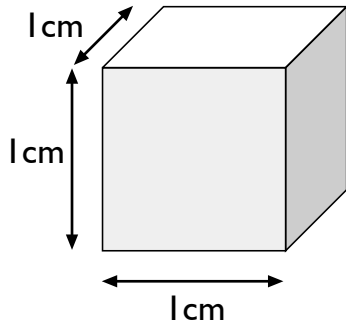


FELTHAM PRESS

Surface area = 6cm^2

Volume = 1cm^3

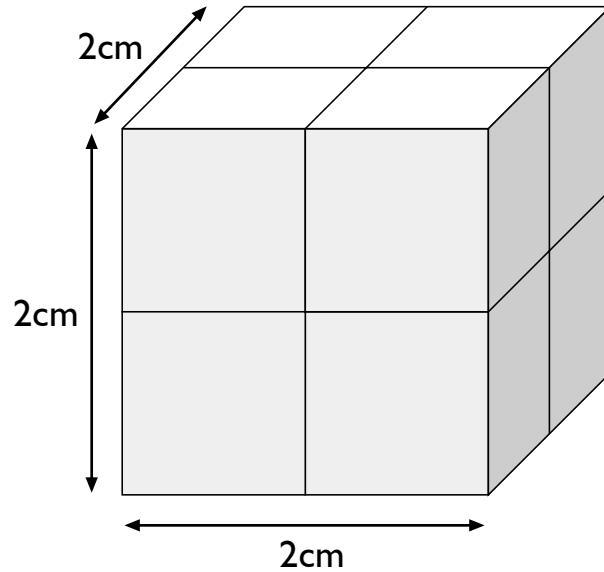
Surface area to volume = $6:1 = 6$



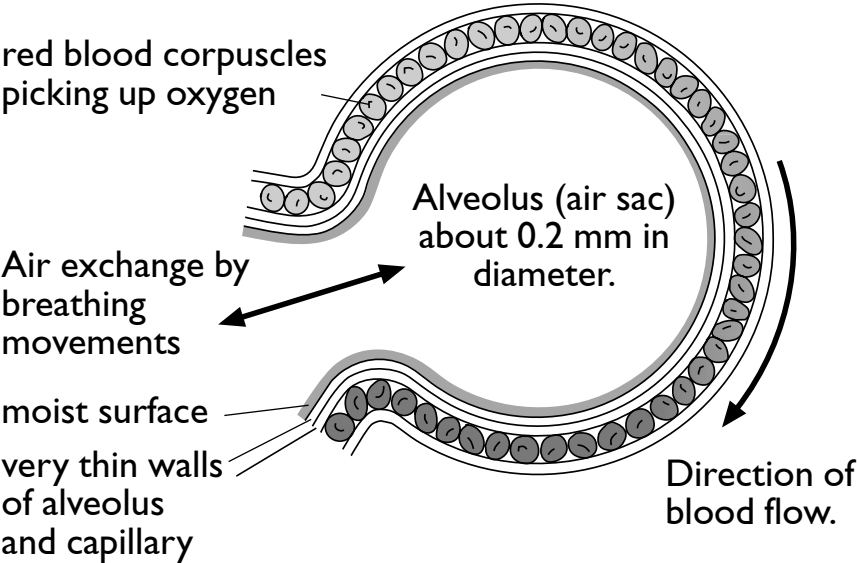
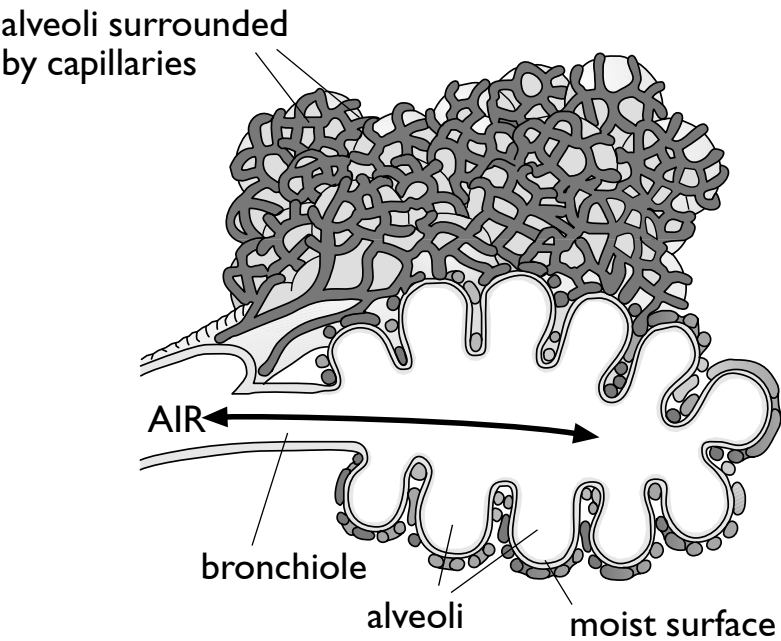
Surface area = 24cm^2

Volume = 8cm^3

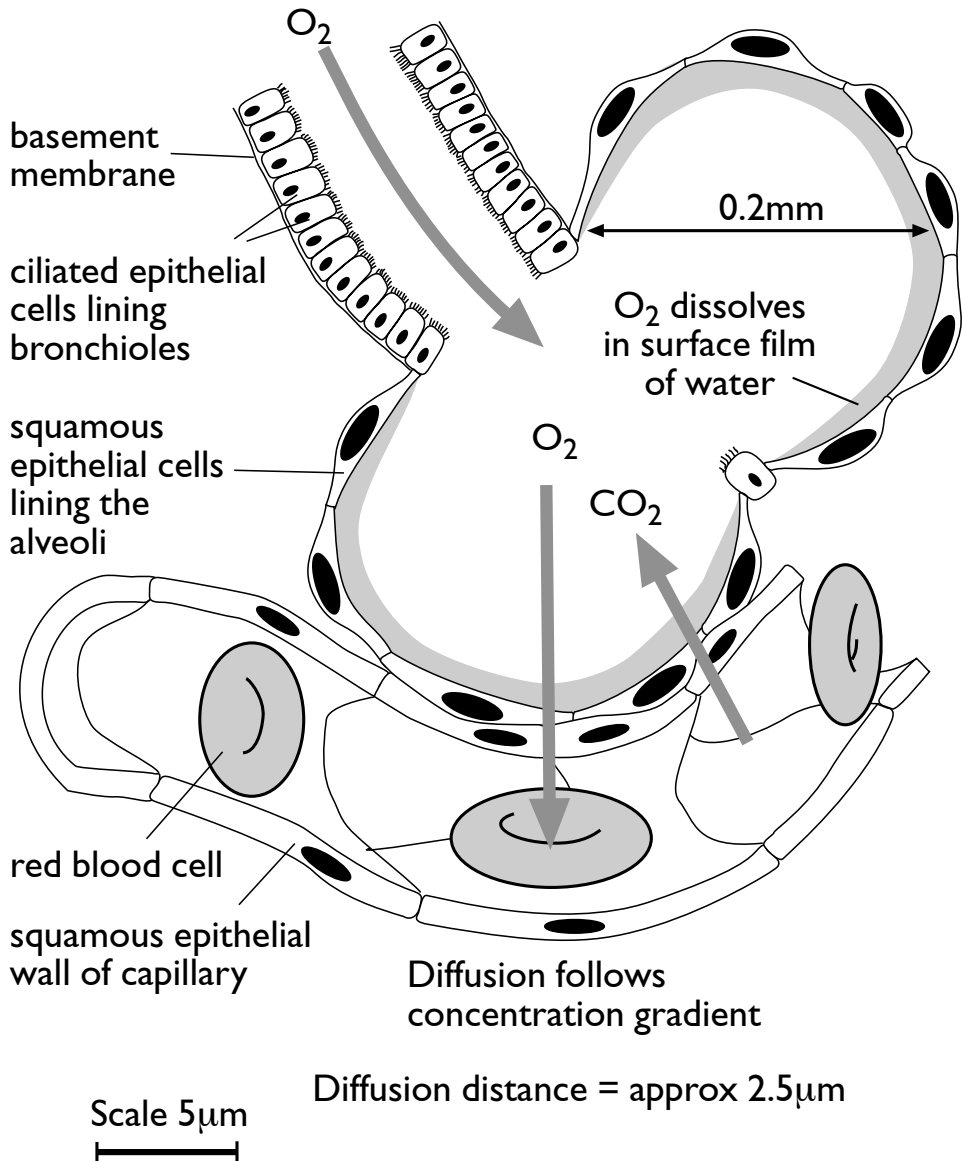
Surface area to volume = $24:8 = 3$

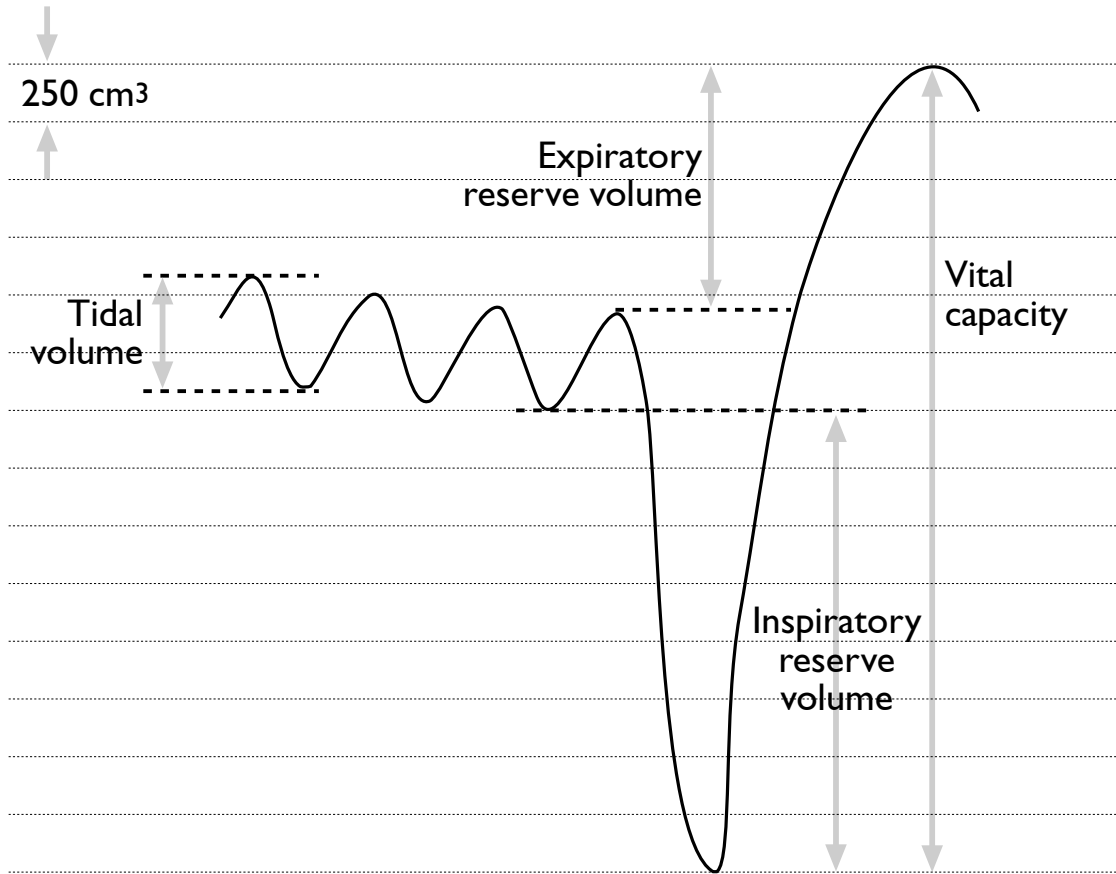


Alveoli and associated capillaries



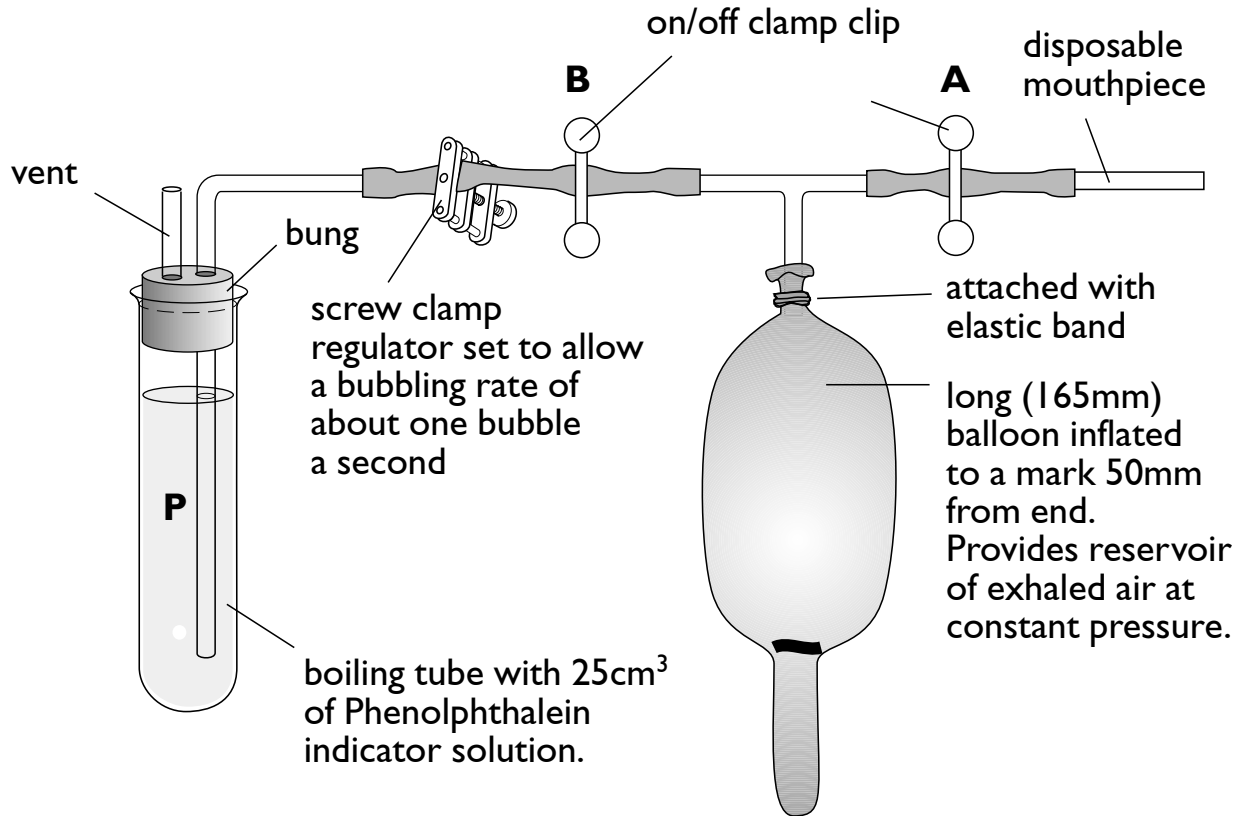
Diffusion at alveolus



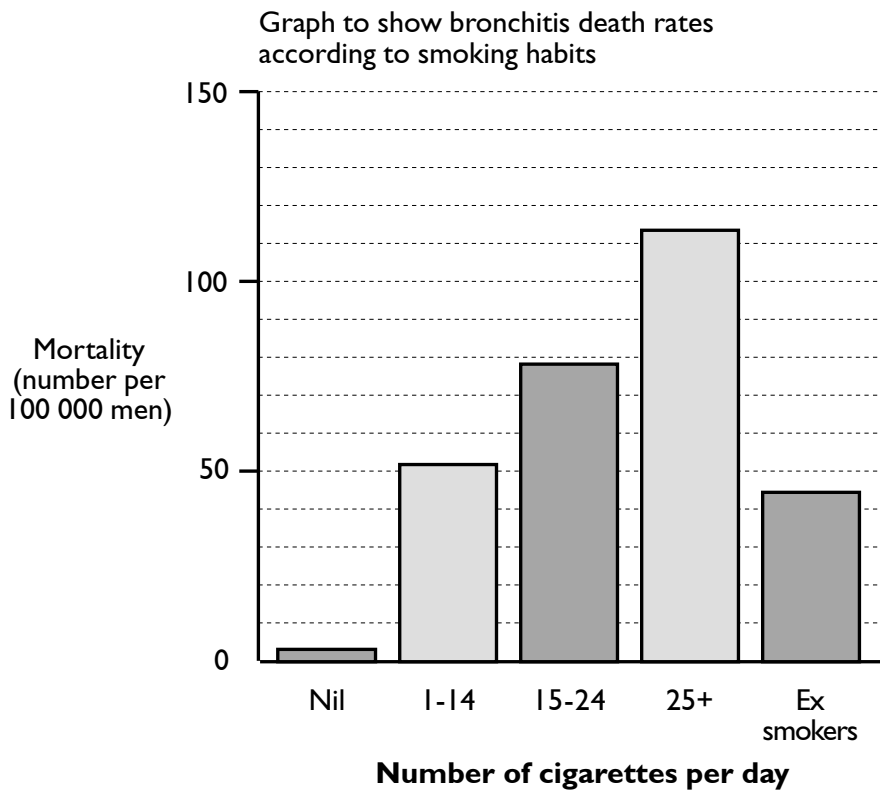


This trace does not show the total lung volume and residual volume, which are not easily measured. With increasing age the residual volume increases from about 20% of the total lung volume to more than 30%.

Simple apparatus for measurement of carbon dioxide levels in expired air



Risk of bronchitis with smoking



Mammalian heart

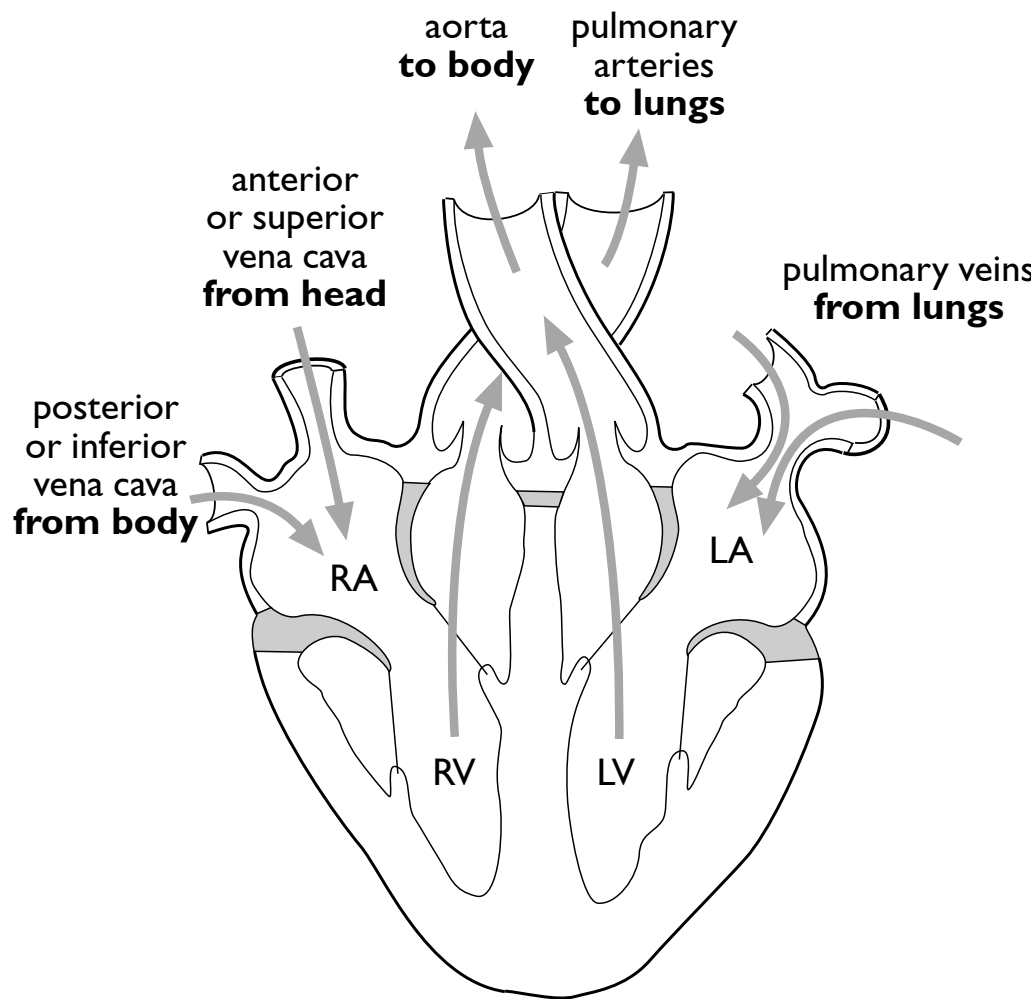


Diagram of heart structure

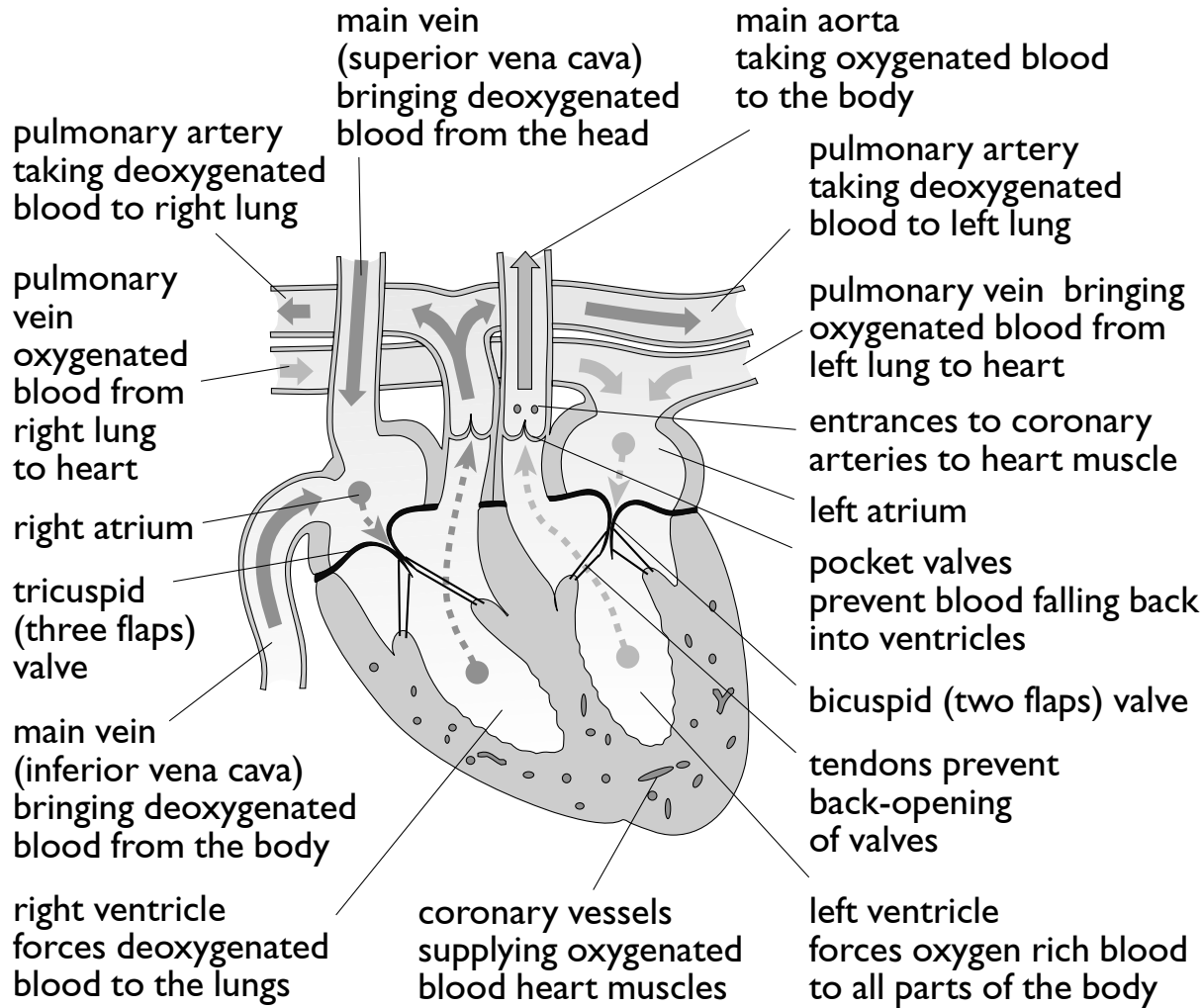
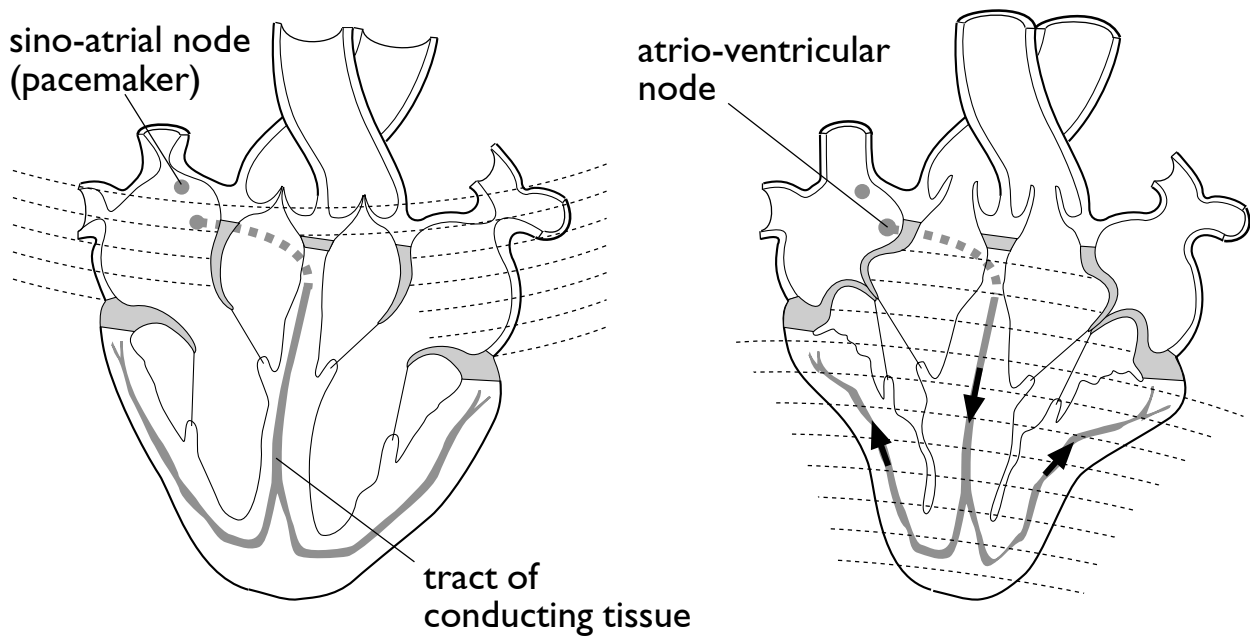
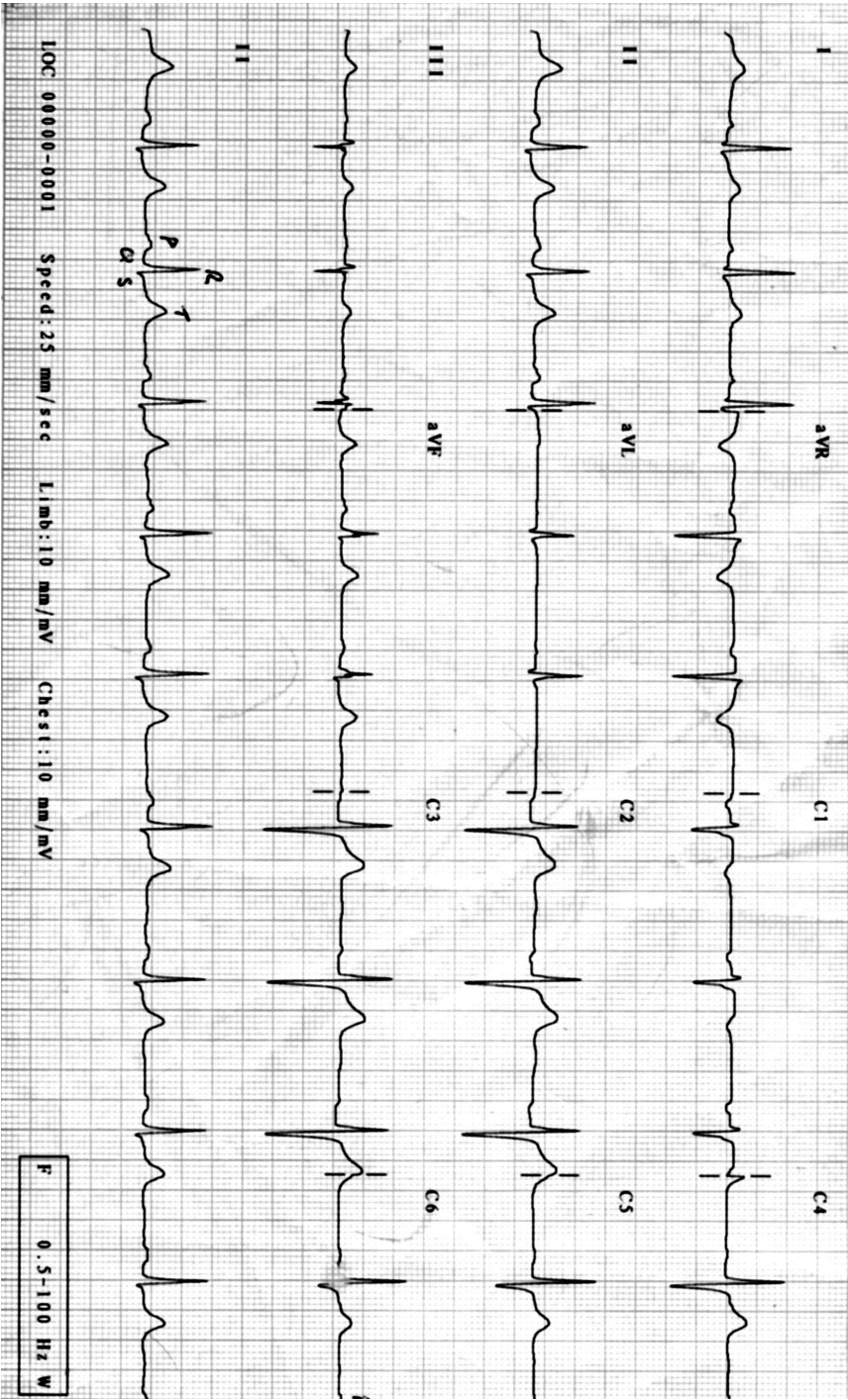


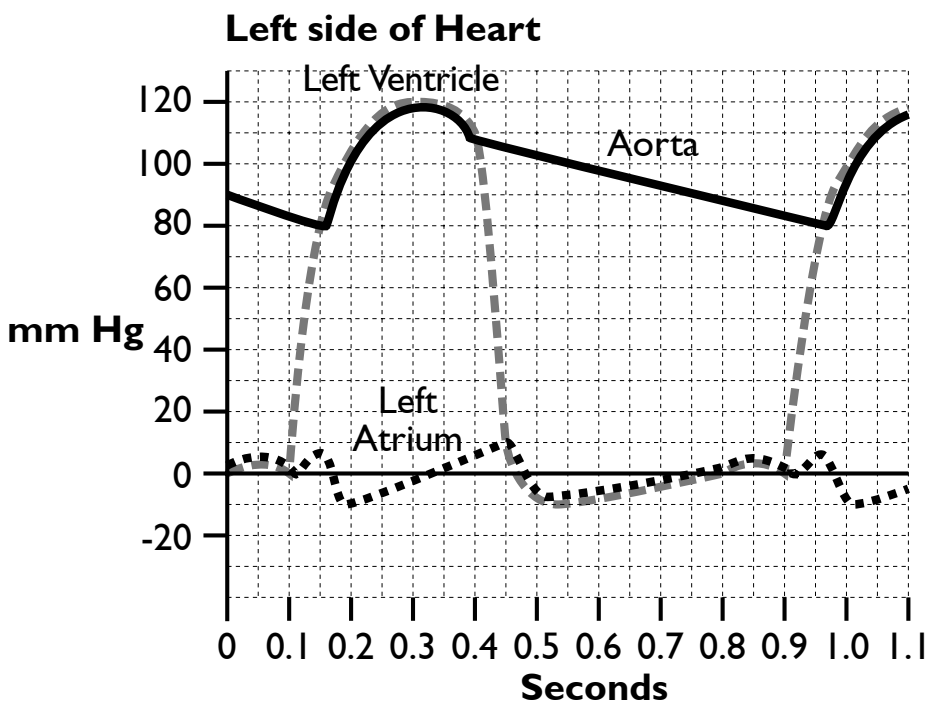
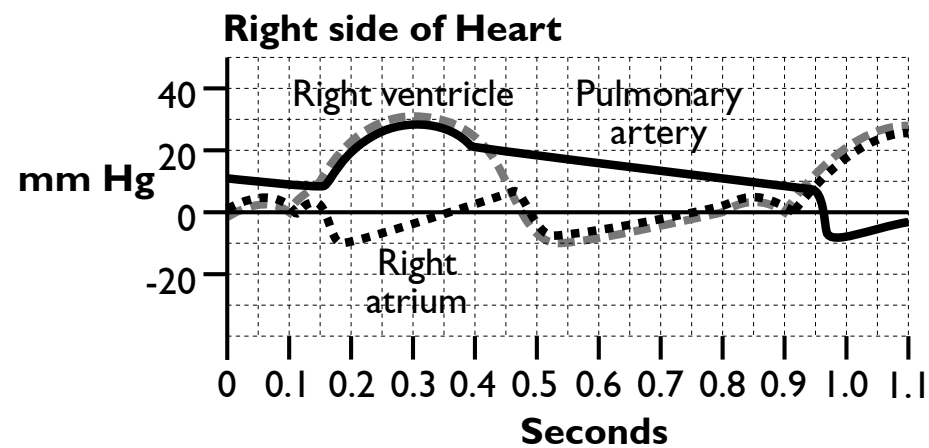
Diagram of heart and SA node

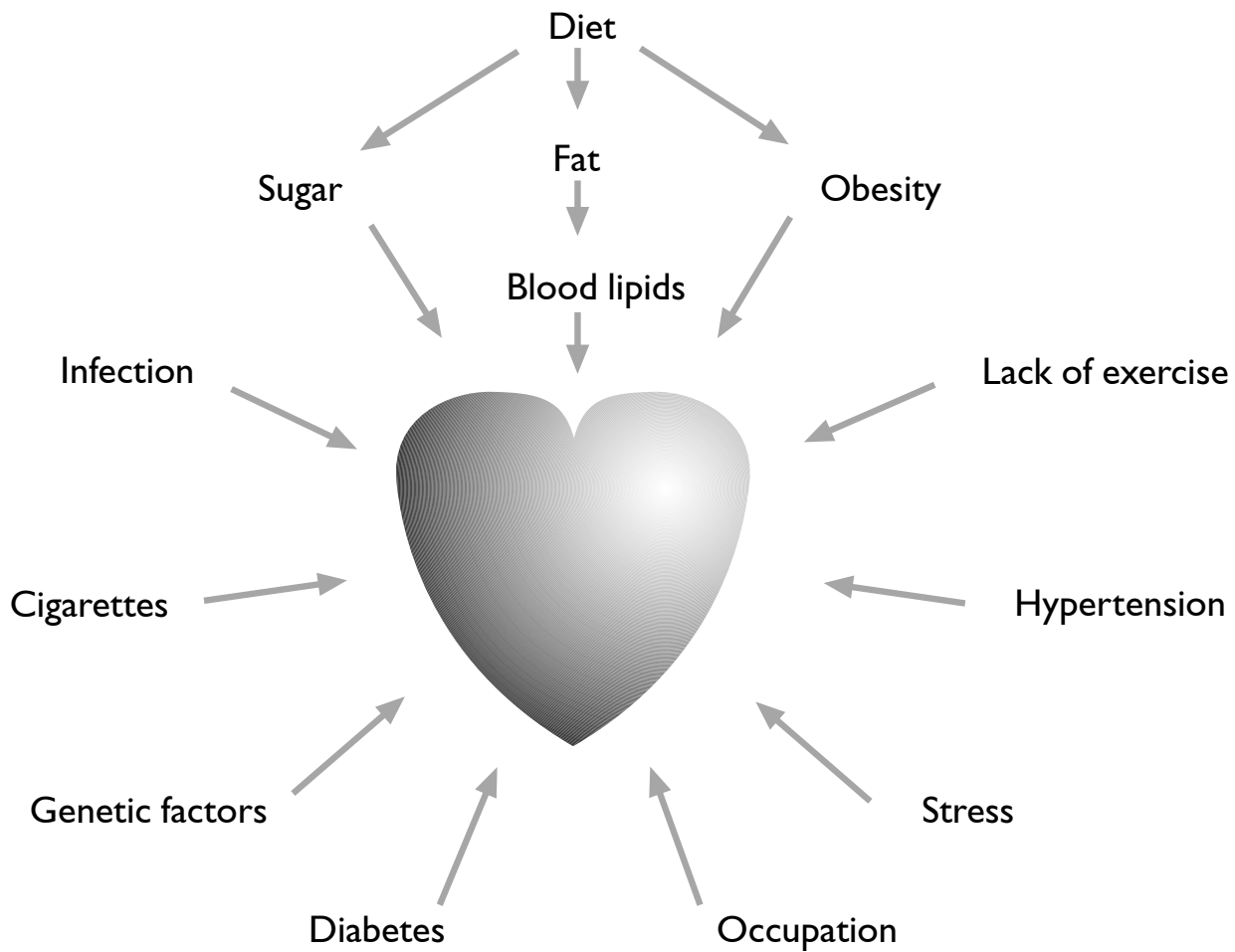


ECG trace



Graph/chart of pressure changes during the cardiac cycle

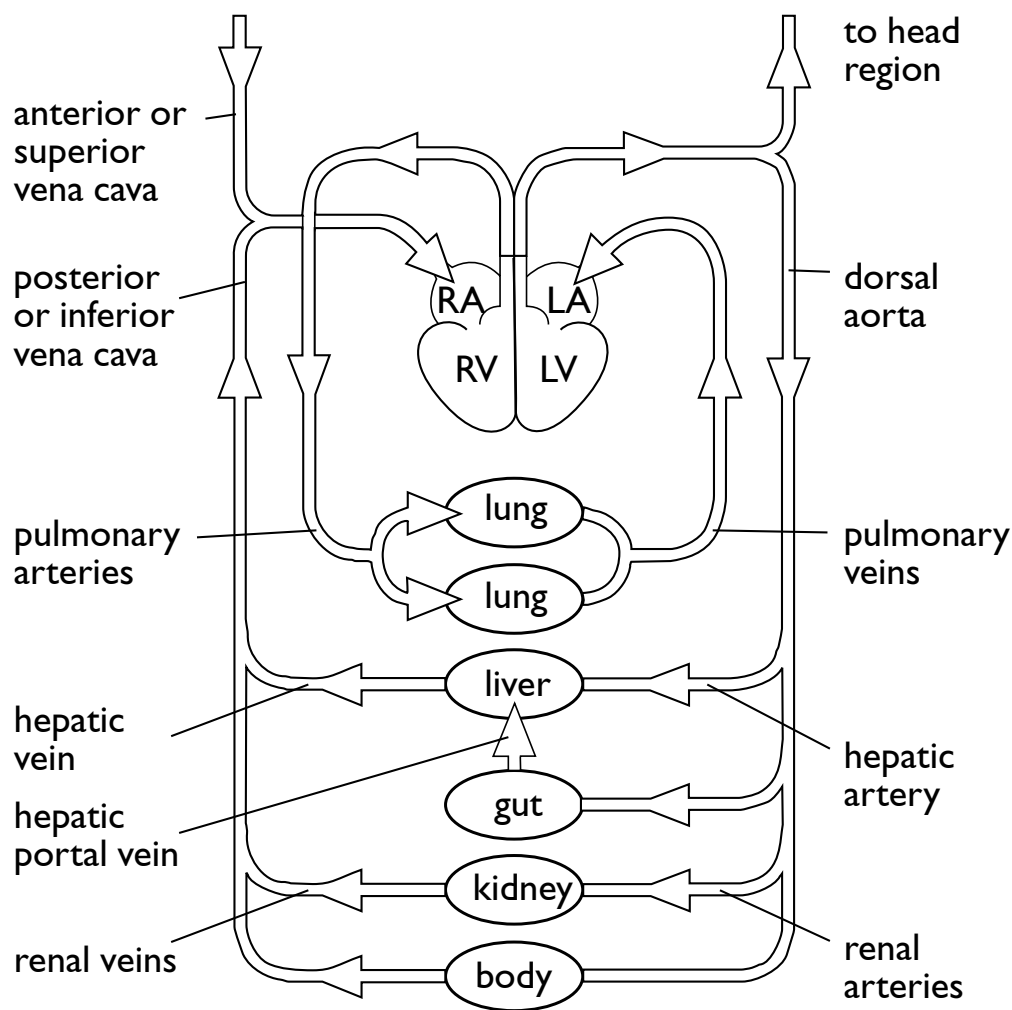




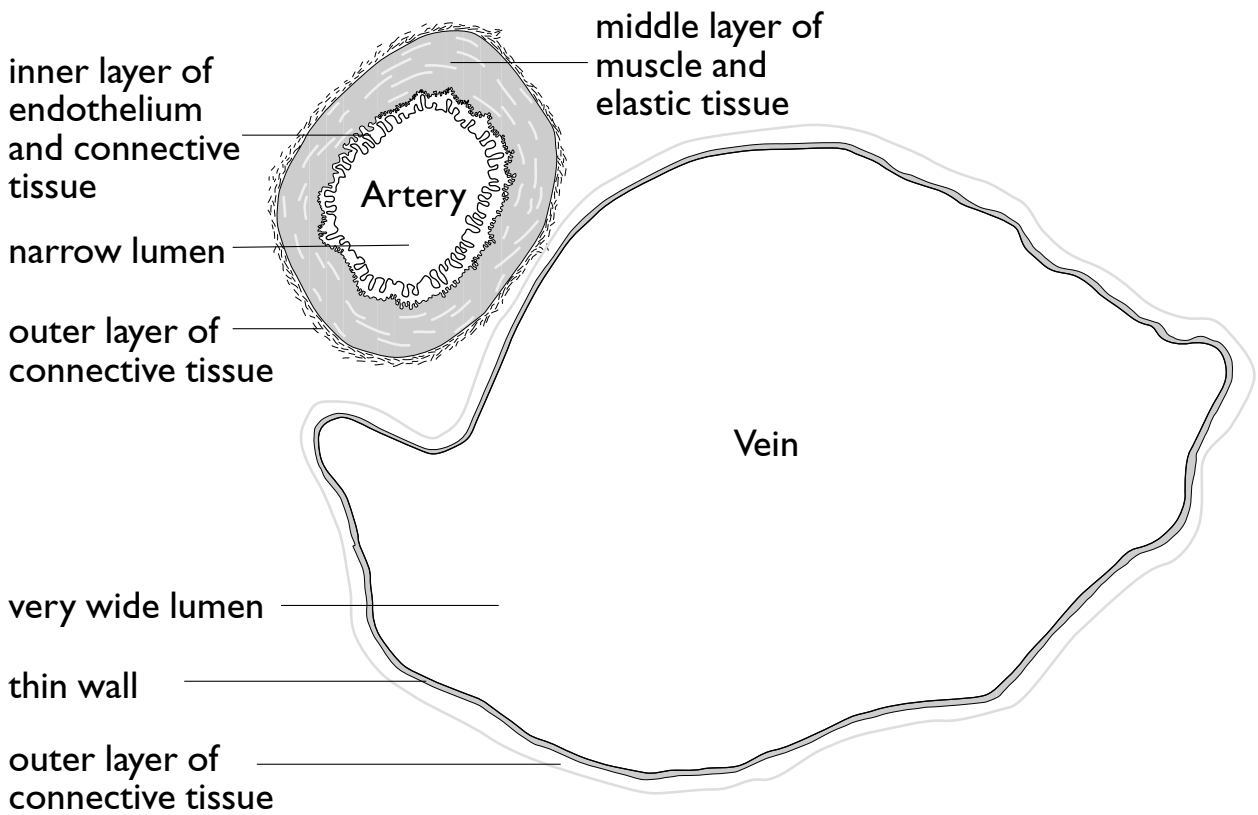
Risk factors in heart disease chart

Age	Sex	Weight	% Animal Fat in Diet	
10-20	Female under 40	More than 2kg below ideal	No animal fat	
21-30	Female under 40-50	Within 2kg of ideal	10% animal fat	
31-40	Female under over 50	15kg over ideal	20% animal fat	
41-50	Male	20kg over ideal	30% animal fat	
51-60	Stocky male	25kg over ideal	40% animal fat	
61 & over	Bald stocky male	30kg over ideal	50% animal fat	Total 1
+				=
Exercise	Tobacco smoking	History of heart disease	Blood pressure	+
Hard manual job & exercise	Non smoker	None	Upper reading 100	↓
Manual job & medium exercise	Cigar or pipe smoker	1 relative over 60	Upper reading 120	
Office job & hard exercise	10 cigs. aday or less	2 relatives over 60	Upper reading 140	
Office job & medium exercise	20 cigarettes aday	1 relative under 60	Upper reading 160	
Office job & light exercise	30 cigarettes aday	2 relatives under 60	Upper reading 180	
No exercise	40 cigarettes aday	3 relatives under 60	Upper reading 200 or more	Total 2
+				=
The higher the total the higher the risk of CHD			Grand Total = _____	

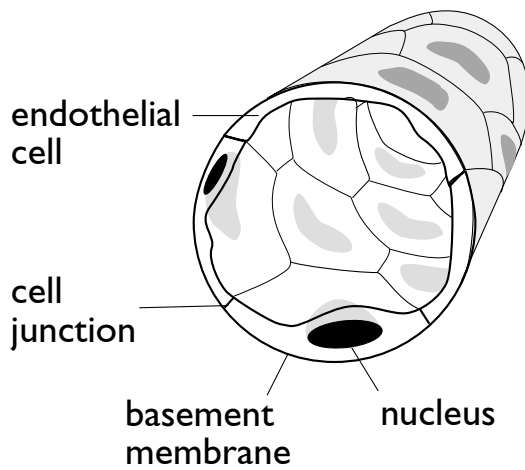
Closed double circulation diagram



Structure of arteries veins as seen under light microscope



Structure of a typical Capillary



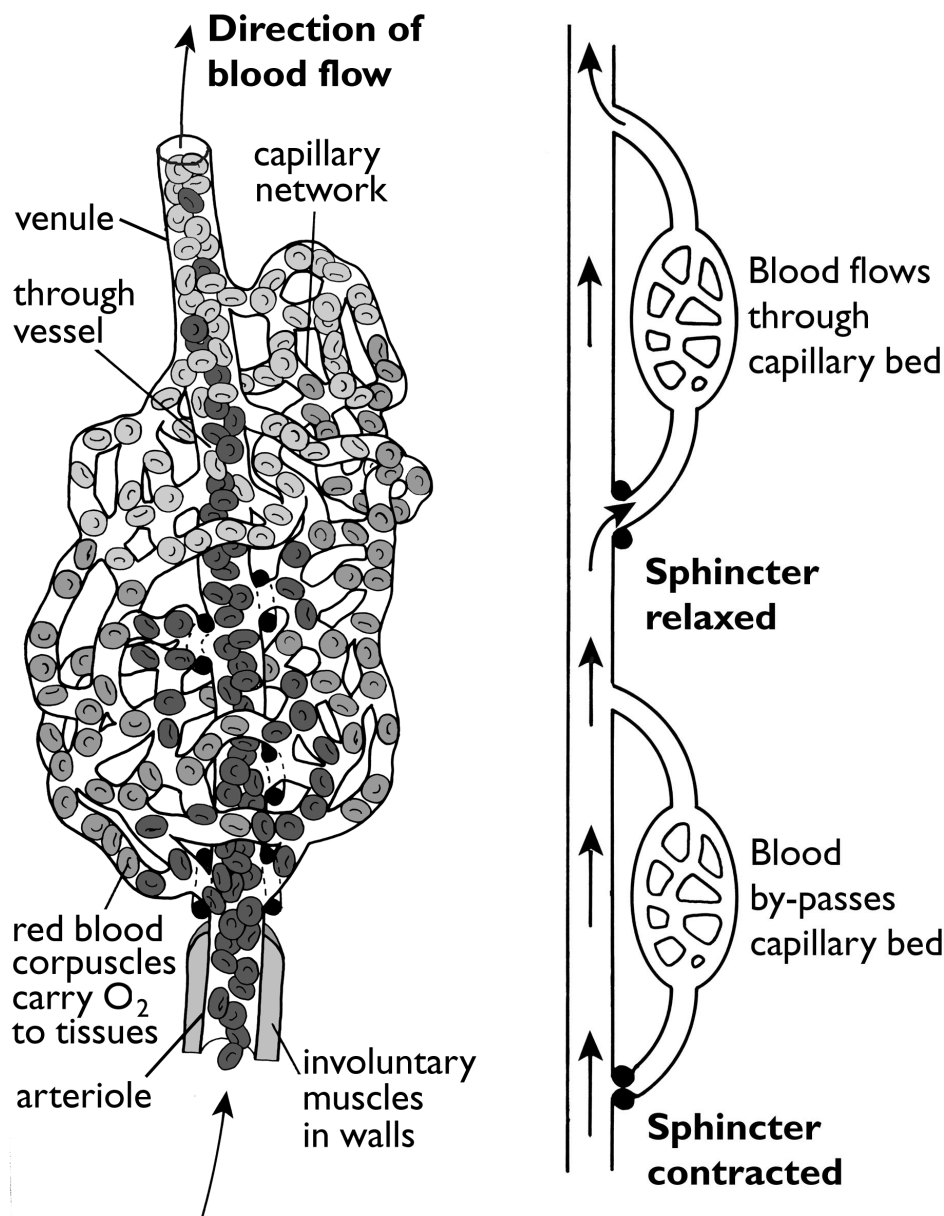
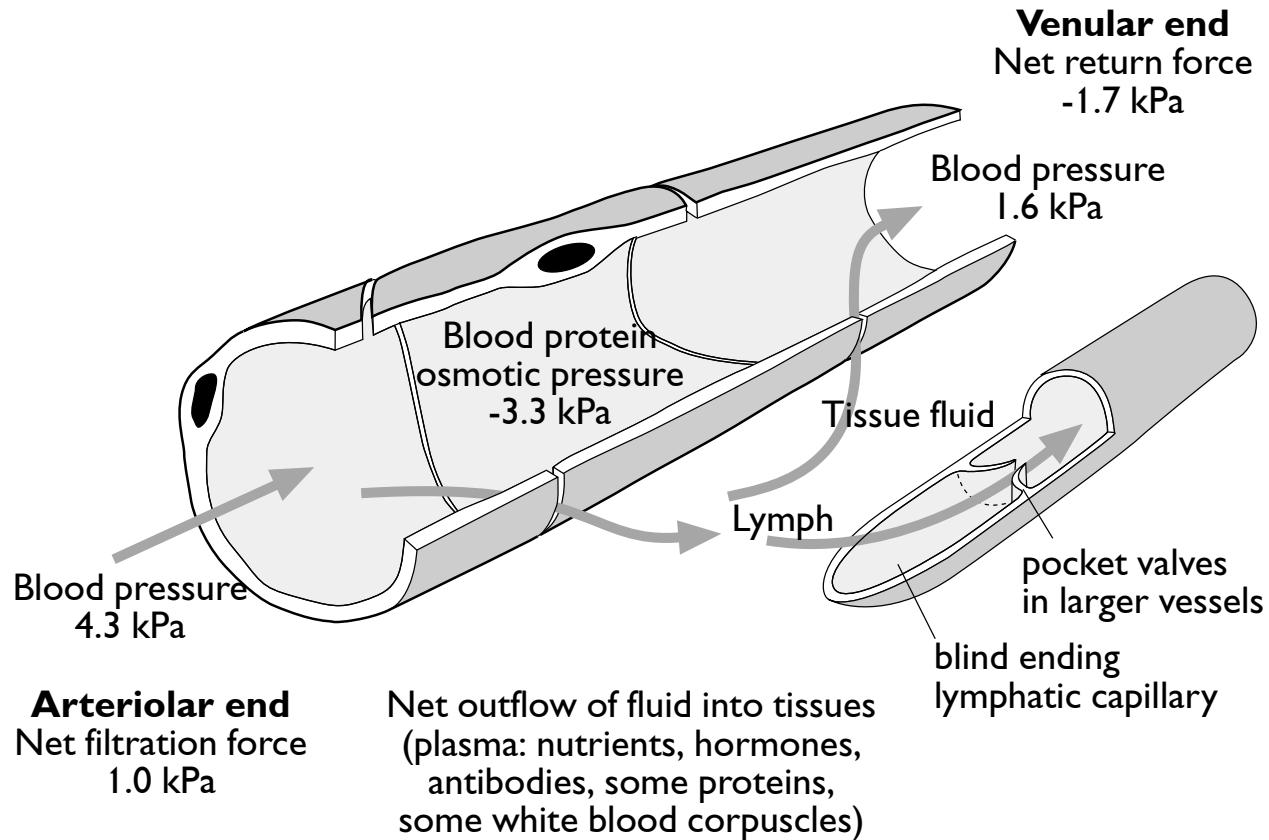
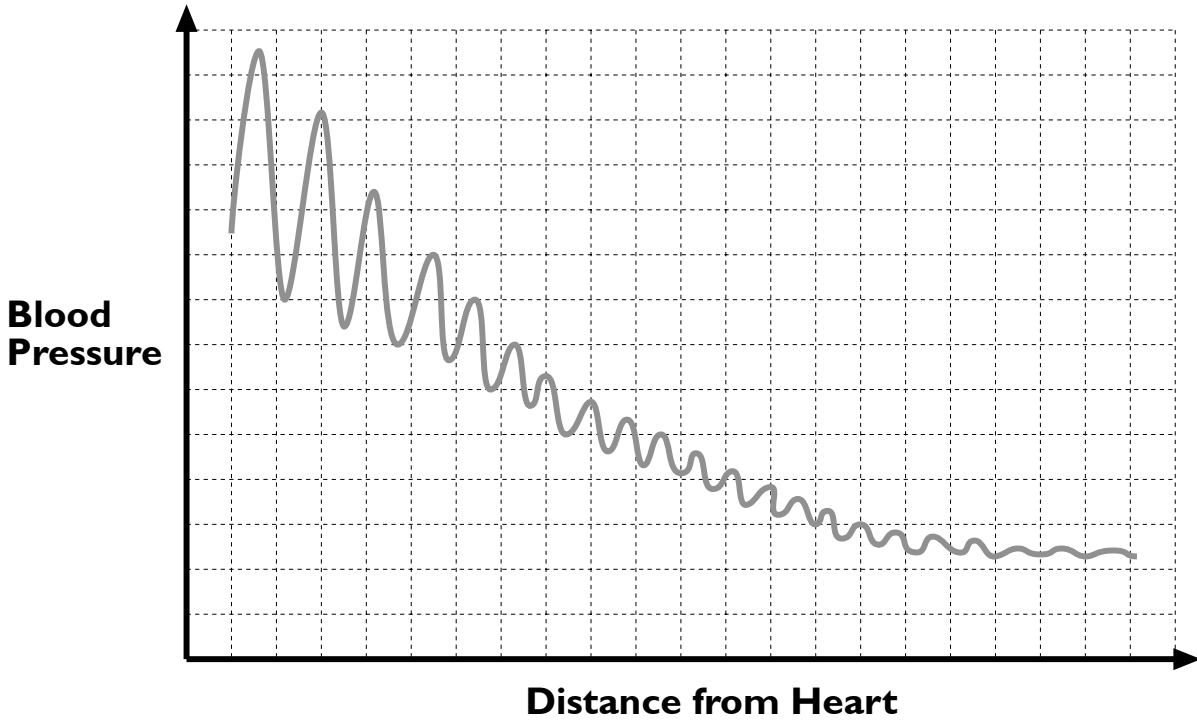
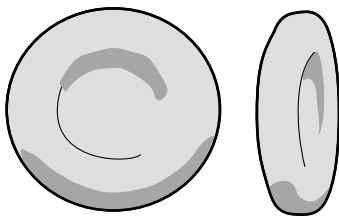


Diagram showing relationship between blood and lymph





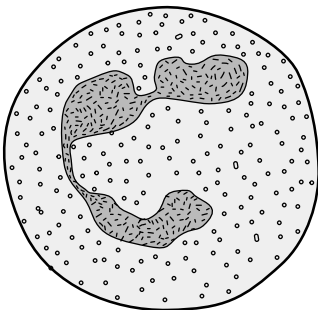
Blood components



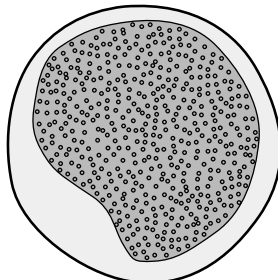
Red cell



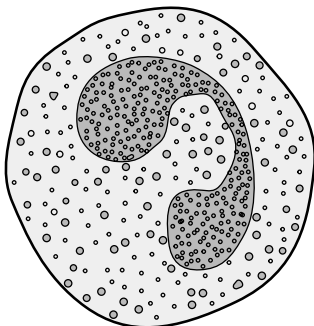
Platelets



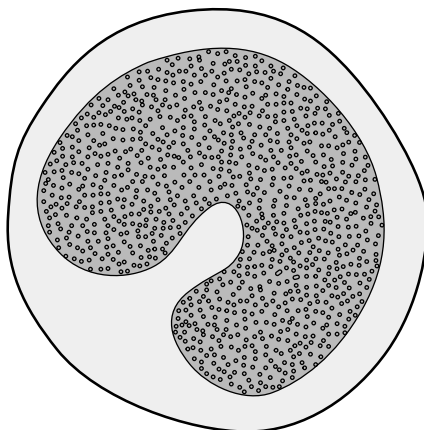
Neutrophil



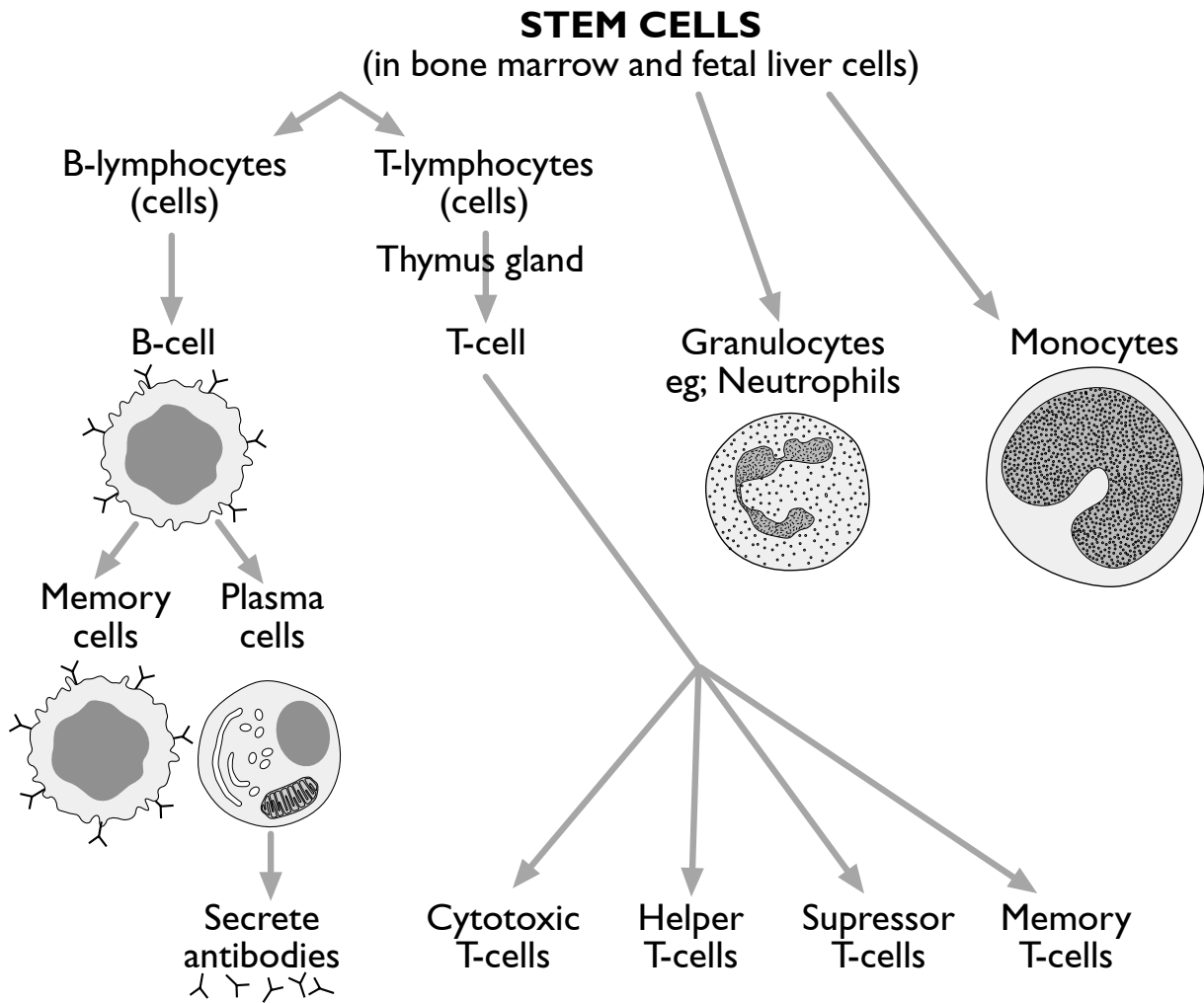
Lymphocyte



Eosinophil



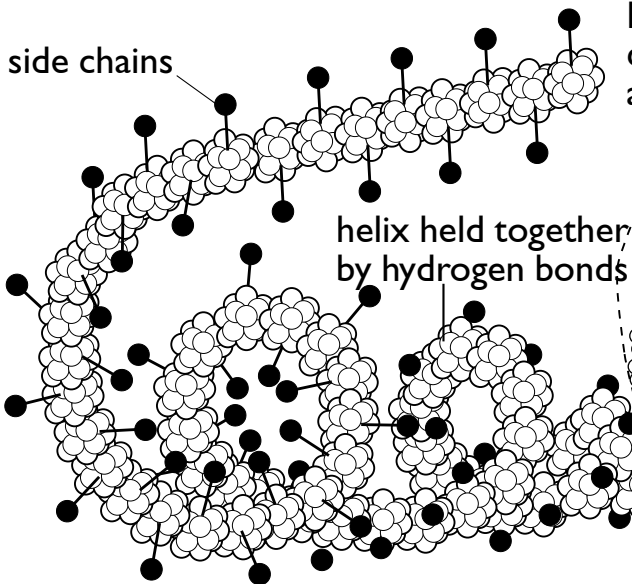
Monocyte



Structure of haemoglobin

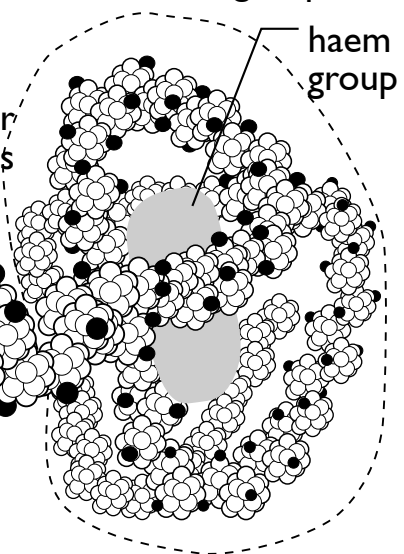
Primary structure

Amino acids join to form a polypeptide chain



Tertiary structure

Helix folds to form compact globular unit around Haem group



Secondary structure

Polypeptide chain folds in upon itself to form a helix

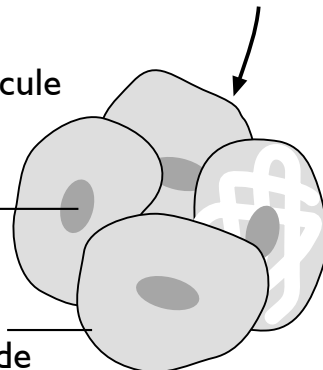
Haemoglobin molecule has four subunits

Quaternary structure

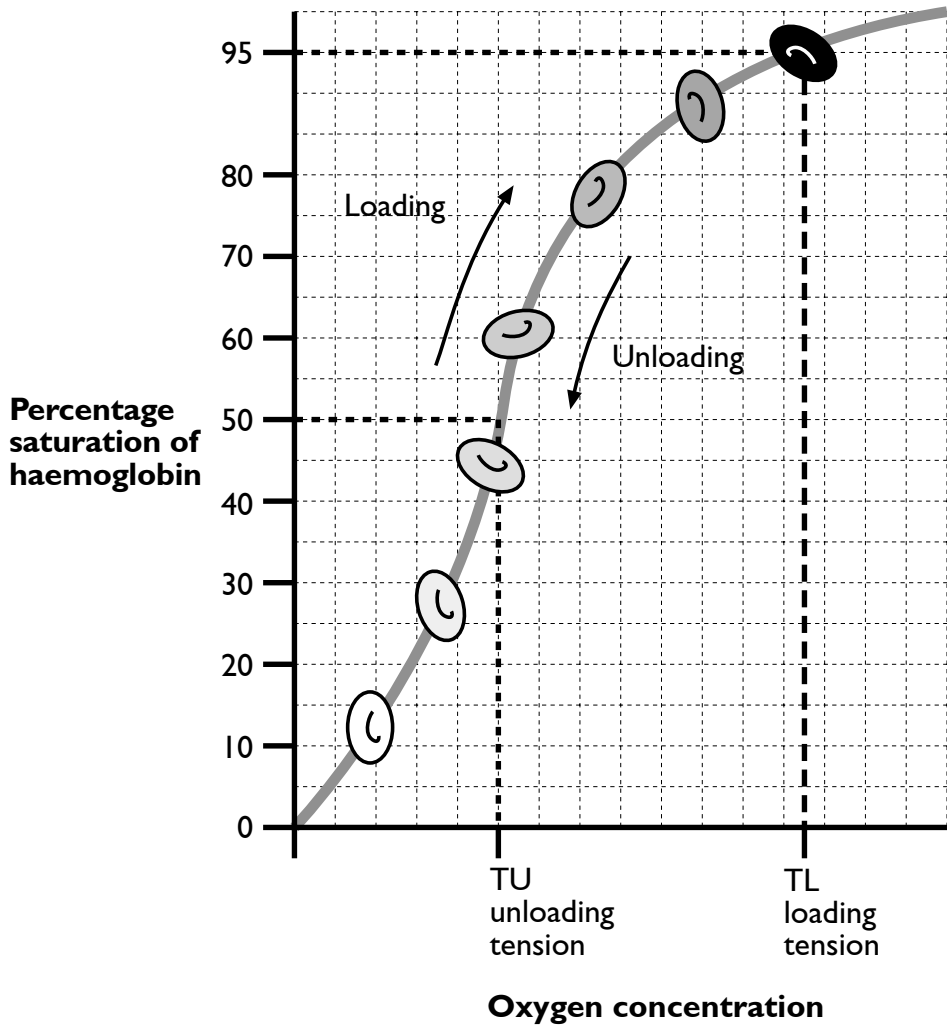
Several polypeptide chain units come together held by disulphide bridges to form a functional protein

haem group

globular polypeptide subunit

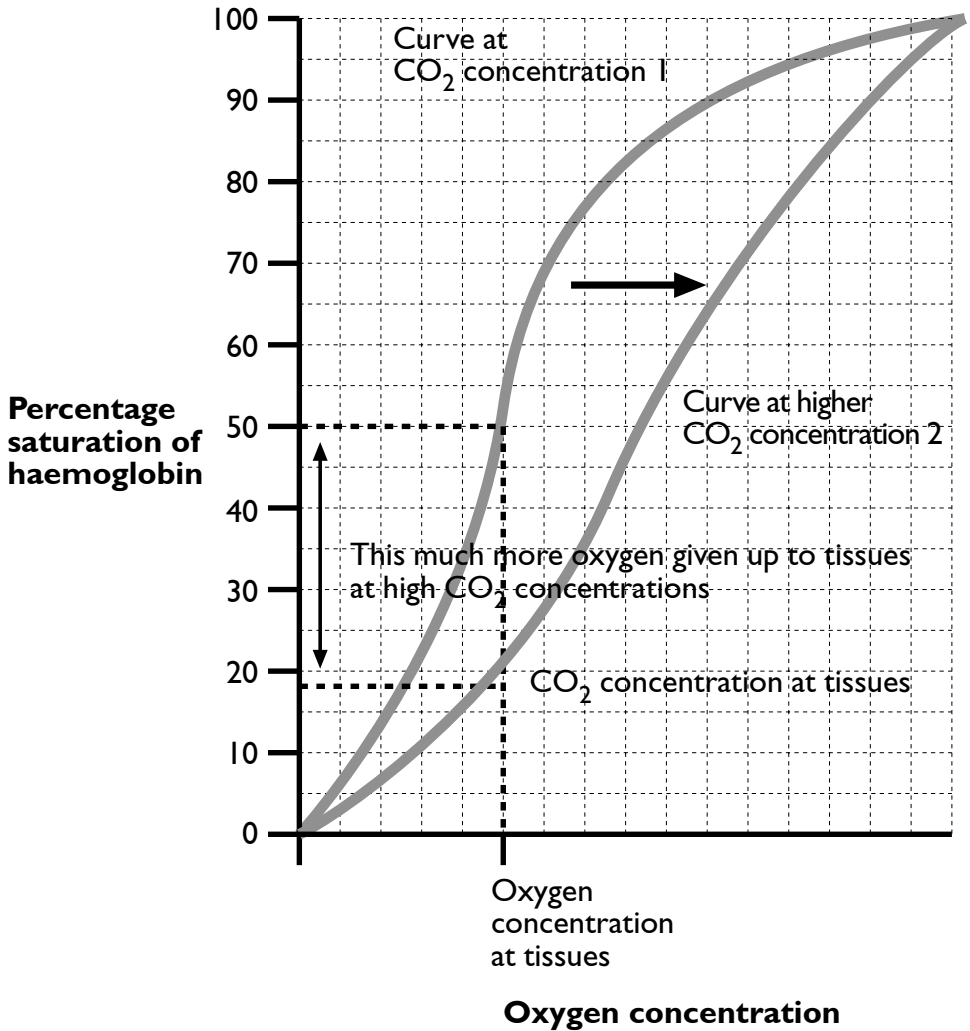


Normal dissociation curve

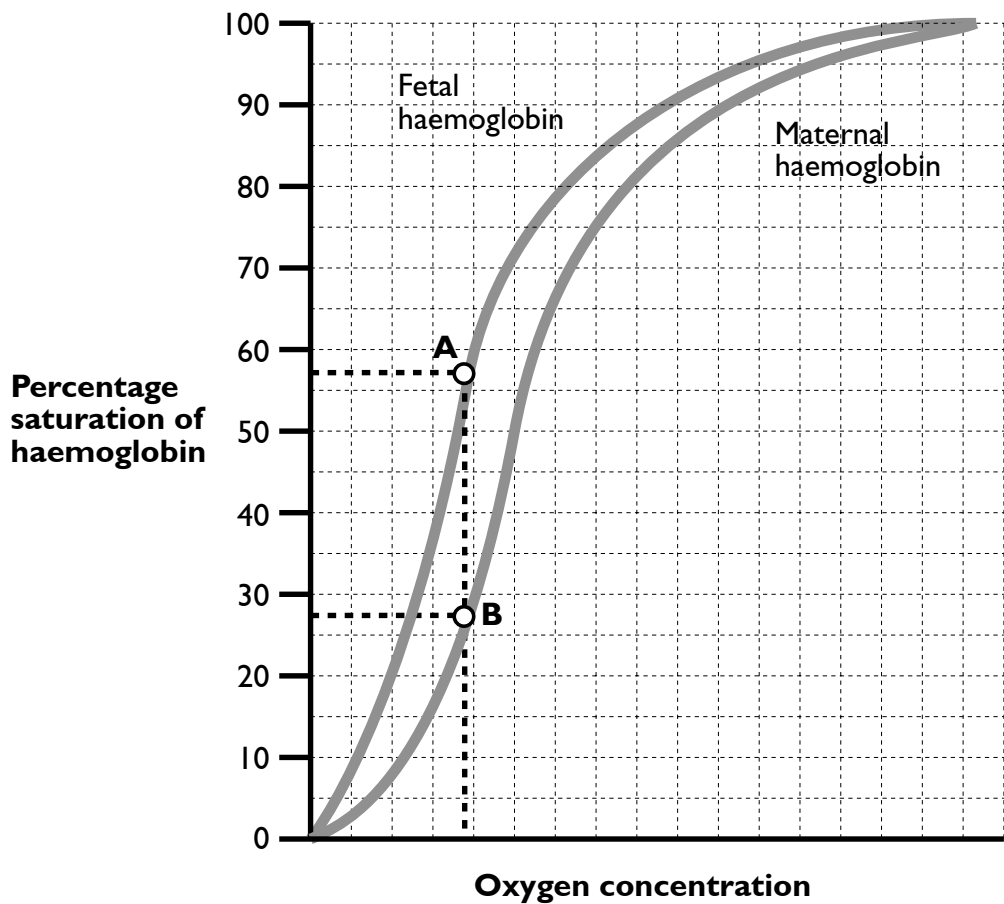


This basic type of curve is altered with differing conditions

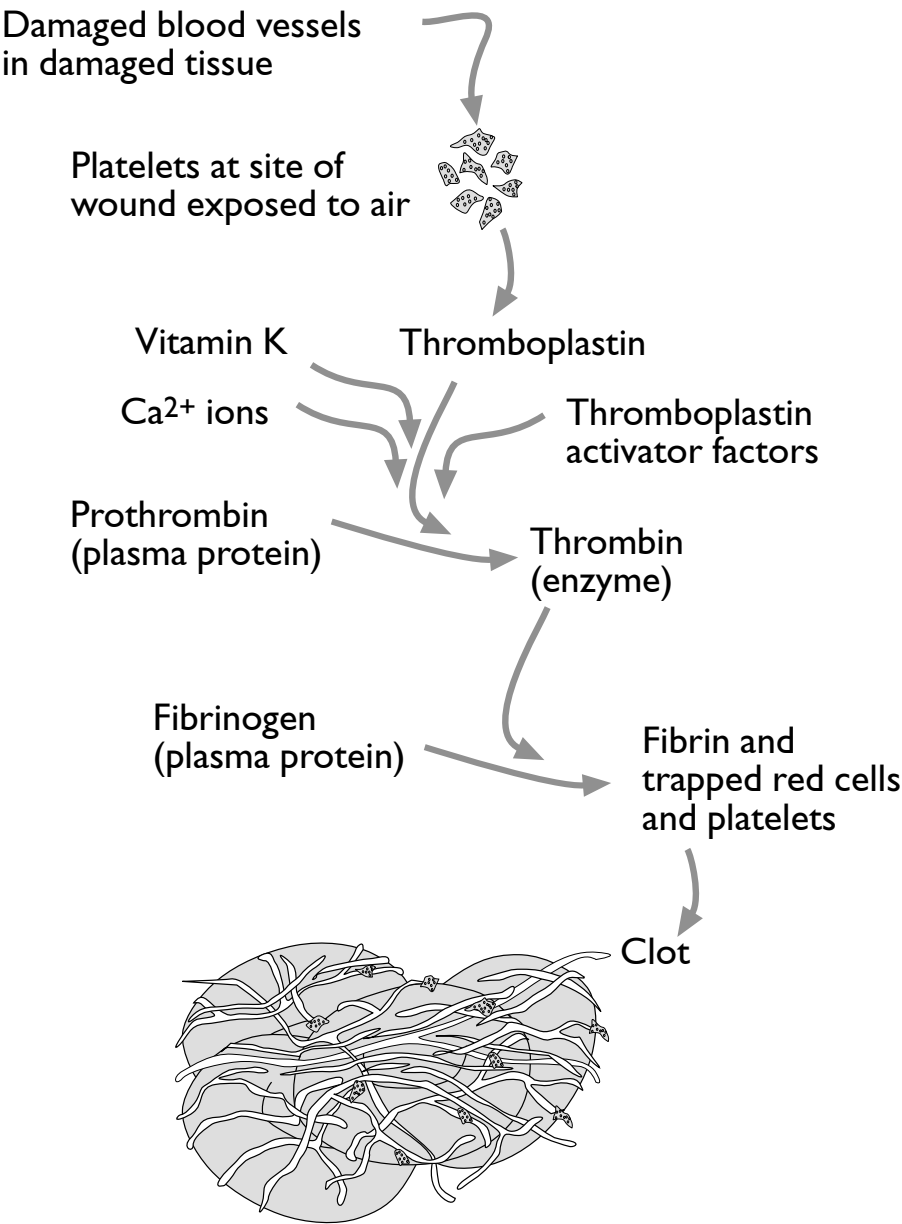
Bohr shift



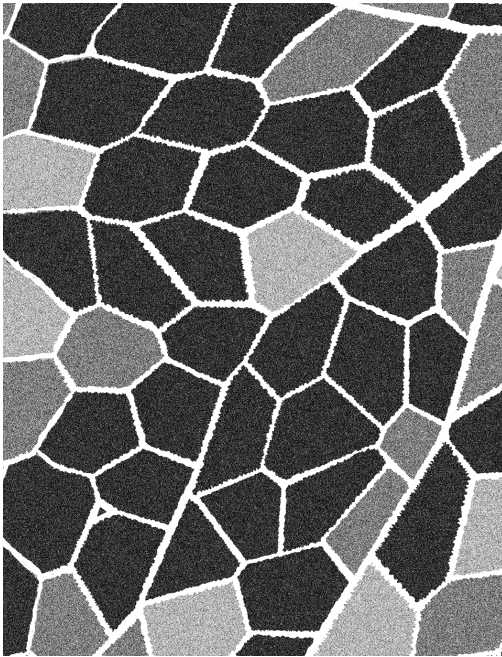
Fetal haemoglobin dissociation curve



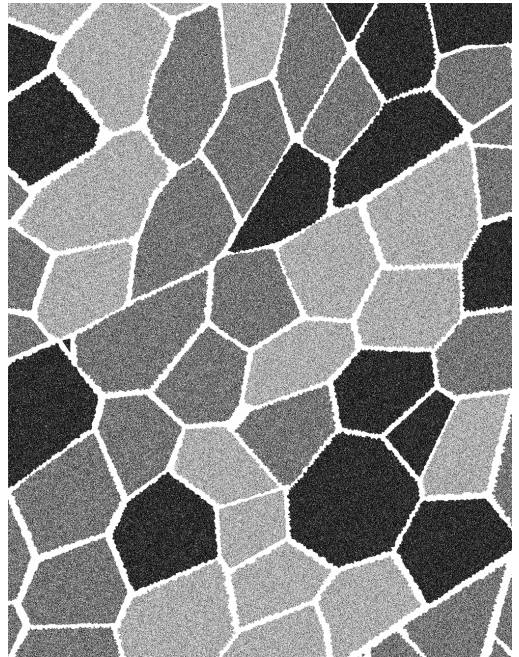
Blood clotting



Fast and slow twitch muscle fibres



Sprint Runner
70% Fast-twitch fibres (*light*)



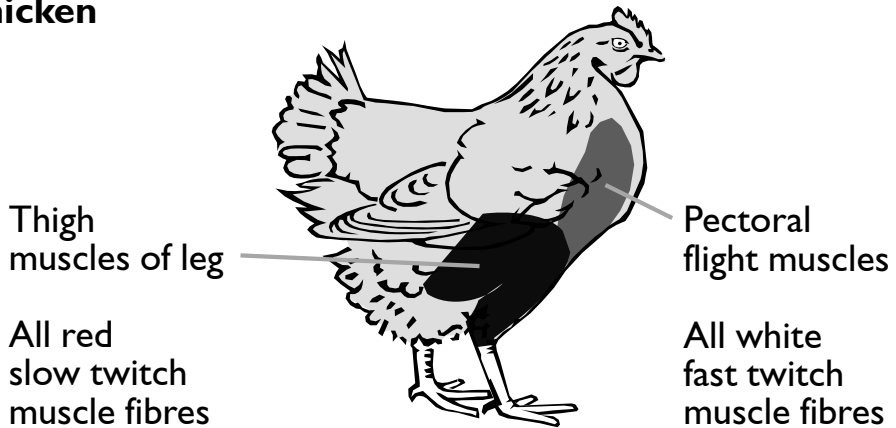
Marathon Runner
90% Slow twitch fibres (*dark*)

Skeletal Muscle Fibre Types and their Properties

Type	Colour	Contraction	Metabolism	Properties
I	Red	Slow-twitch	Oxidative (aerobic)	Fatigue resistant Low force/power
IIA	White	Fast-twitch	Oxidative/glycolytic (aerobic/anaerobic)	Intermediate
IIB	White	Fast-twitch	Glycolytic (anaerobic)	Fatigue susceptible High force/power

Chicken muscles

Chicken



Dark red chicken leg



White chicken breast

Oxygen deficit and oxygen debt

